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(54) Title: MIRROR ACTUATOR HOUSING CONSTRUCTION

(57) Abstract

A mirror actuator housing construction comprises a mirror housing frame having an actuator housing and a mirror–adjusting plate with mirror provided therein. Located in the actuator housing are drive means for rotating the mirror–adjusting plate with mirror relative to the mirror housing frame about a mirror rotation point located adjacent the mirror–adjusting plate. The mirror rotation point is a virtual rotation point relative to which the actuator housing is movably connected to the mirror housing frame, while the mirror plate with mirror is fixedly mounted on the actuator housing. The actuator housing with the components provided therein and secured thereon can be snap–fitted on the mirror housing frame as a unit.

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Title: Mirror actuator housing construction

The present invention relates to a mirror actuator housing construction, in particular for a wing mirror of a vehicle, comprising a mirror housing frame having an actuator housing and a mirror-adjusting plate with mirror mounted therein, in which actuator housing drive means are present for rotating the mirror-adjusting plate with mirror relative to the mirror housing frame about a mirror rotation point located adjacent the mirror-adjusting plate.

It is known to fixedly mount the actuator housing on the mirror housing frame and to fix the mirror-adjusting plate with mirror on the actuator housing via a ball joint construction. The drive means are typically formed by two motors, each having a gear transmission mechanism for driving a relevant spindle to effect a translatory movement of the spindle in the longitudinal direction thereof. Since this spindle engages the mirror-adjusting plate with mirror in a point spaced from the mirror rotation point, there is thereby obtained a tilting of the mirror-adjusting plate about a relevant virtual axis through the mirror rotation point defined by the ball joint construction.

However, due to the presence of a specific ball joint construction, too much space is occupied in the actuator housing and a continuing scaling down, which also occurs on the market for vehicle mirrors, is rendered difficult.

The object of the invention is to enable a more compact construction of the actuator housing.

To that end, in accordance with the invention, the mirror actuator housing construction as described in the preamble is characterized in that the mirror rotation point is a virtual rotation point relative to which the actuator housing is movably connected to the mirror housing frame, and that the mirror plate with mirror is fixedly mounted on the actuator housing.

Although such a rotation possibility of the entire according to with fittings relative to the mirror housing frame can be realized for only one axis, it will of course be highly desirable to realize this for both axes. For that reason, in the actuator housing, the drive means are mounted for a rotation of the actuator housing with mirror-adjusting plate and mirror about two mutually perpendicular axes through the rotation point relative to the mirror housing frame. In particular, this construction enables the actuator housing with the components fitted therein and secured thereon to be snap-fitted on the mirror housing frame as a unit.

For reasons of stability, it is favorable when the drive means in the actuator housing on the one hand and the mirror-adjusting plate with mirror on the other be located on either side of the virtual rotation point adjacent the mirror-adjusting plate.

To obtain a virtual rotation point as mentioned, the actuator housing can be formed by a substantially spherical holder, while, further, a substantially spherical bowl is present, which holder and bowl, one inserted into the other, are rotatable relative to each other about a first axis, the X-axis, and a second axis, the Y-axis, which axes lie in a plane substantially coinciding with the plane of the outer edge of the holder or extending parallel thereto, and containing said rotation point. In this connection, the bowl is considered to form a part of the mirror housing frame. In a particularly favorable embodiment, a dish located between the holder and the bowl is present, which dish is connected to the bowl for rotation about the X-axis only and which is connected to the holder for rotation about the Y-axis only. The mirror housing frame with the bowl can be manufactured as a first unit, while the holder with drive means and mirror-adjusting plate with mirror can be manufactured as a second unit, which can readily be

snapped (with the interposition of the dish) into the first unit.

To enable a motor drive of this second unit relative to the first unit, the holder, viewed in the X-Y plane, comprises two mutually perpendicular slots provided through the holder, each of said slots having an adjusting element provided therein for displacement by motor, which adjusting element is further freely movable in the bowl in a direction, viewed in the X-Y plane, perpendicular to the direction of the relevant slot in the holder, wherein, further, the adjusting element engages, through the relevant slot in the holder, a drive mechanism placed in the holder, which drive mechanism is connected to a motor that is likewise placed in the holder.

The construction as described further enables providing the holder with an electric plug terminal, while on the mirror-adjusting plate, a separate electric terminal is present for an electric connection to the plug terminal on the actuator housing, enabling ready through-connecting by looping.

Apart from a mirror actuator housing construction, the invention also relates to a wing mirror for a vehicle, comprising a mirror actuator housing construction as indicated hereinabove.

The invention will presently be specified with reference to the accompanying drawings. In these drawings:

Figs. 1-5 represent five views of the holder;

Figs. 6-9 represent four views of the dish;

Figs. 10-13 represent four views of the bowl;

Figs. 14-17 represent four views of the assembly of the holder, the dish and the bowl of Figs. 1-13;

Fig. 18 shows a section of this assembly taken on the line A-A in Fig. 14;

Figs. 19-22 represent four views of the assembly of the holder and the dish;

Figs. 23 and 24 show sections taken on the line B-B and C-C respectively in Fig. 19;

Figs. 25-28 represent four views of the assembly of the dish and the bowl;

Figs. 29 and 30 show sections taken on the line D-D and E-E respectively in Fig. 25;

Figs. 31-33 represent various exploded views of an actuator housing construction for a wing mirror of a vehicle;

Figs. 34-37 represent various views of an alternative embodiment of the dish;

Fig. 38 shows the adjusting element for enabling rotating the holder and the bowl relative to each other; and

Fig. 39 schematically shows a mirror actuator according to the invention.

In the Figures, identical parts are designated by the same reference numerals.

An exemplary embodiment of the movement mechanism according to the invention, as shown in parts and in interconnection of these parts in Figs. 1-33, comprises a spherical holder 1, a spherical bowl 2 and a dish 3. The holder, the bowl and the dish are manufactured from plastic. With the interposition of the dish 3, the holder 1 can be inserted into the bowl 2. The dish 3 is then only rotatable about the X-axis relative to the bowl 2 and only rotatable about the Y-axis relative to the holder 1, the X-axis and the Y-axis lying in a plane substantially coinciding with the outside edge of the holder 1.

To realize the rotatability of the holder 1 relative to the dish 3 about the Y-axis, two diametrically opposite slots 4 and 5 are provided in the holder 1, and the dish 3 has its inside surface provided with thickenings 6 and 7 fitting in these slots 4 and 5 respectively. Upon rotation of the holder 1 relative to the dish 3 about the Y-axis,

the thickenings 6 and 7 move in the slots 4 and 5 respectively. Further, the holder 1 has its outside surface provided with diametrically opposite, circularly curved edges 8 and 8a which, upon rotation of the holder 1 relative to the dish 3, serve as guide edges for correspondingly shaped edges of slots 9 and recesses 9a respectively, provided in the dish 3. Between the edges of the slots 9 and the circular recess 9a of the dish on the one hand and the thickenings 8 and 8a on the other, the holder 1 and the dish 3 are snap-fitted for movement relative to each other about the Y-axis.

To realize the rotatability of the dish 3 relative to the bowl 2 about the X-axis, two diametrically opposite slots 10 and 11 are provided in the bowl 2, and the dish 3 has its outside surface provided with thickenings 12 and 13 fitting in the slots 10 and 11 respectively. Upon rotation of the dish 3 relative to the bowl 2 about the X-axis, the thickenings 12 and 13 move in the slots 10 and 11 respectively. Further, the bowl 2 is provided with diametrically opposite, circular edges 14 which, upon rotation of the dish 3 relative to the bowl 2, serve as guide edges for correspondingly shaped edges of thickenings 15 provided on the outside surface of the dish 3. Between the thickenings 12, 13 on the one hand and the thickenings 15 on the other, the bowl 2 and the dish 3 are snap-fitted for movement relative to each other about the X-axis.

As extra securement against rotations about the Z-axis perpendicular to the X-axis and the Y-axis, additional locking means in the form of thickenings 16 provided on the outside surface of the dish 3 are present between the dish 3 and the bowl 2, which engage recesses 17 when the holder with dish are mounted in the bowl.

The movement of the holder 1 relative to the dish 3 and that of the dish relative to the bowl 2 is bounded. For this purpose, the holder has an outwardly directed, circular edge 18. Further, viewed in a section

perpendicular to the Y-axis, as shown in Fig. 8, the dish 3 is segment-shaped with an apex angle smaller than 180°. When the holder 1 rotates about the Y-axis relative to the dish 3, the upper edges of the dish 3 will, in the two extreme positions, strike the edge 18. Upon rotation of the dish 3 relative to the bowl 2, the thickenings 12, 13 will, in the extreme positions, be arrested by the end edge of the slots 10, 11 or, which is of course also possible, the upper edges of the bowl will be arrested by the projecting edge 18 of the holder.

The bowl 2 further comprises mounting bushes 19. By means of screws passed through these bushes, the bowl can be secured in, for instance, a mirror housing frame for a wing mirror of a vehicle. When, in this practical application, a mirror-adjusting plate 33 with mirror 34 (see Fig. 39) is secured on the holder 1, in particular on the edge 18 hereof, this mirror is manually rotatable about the X-axis and the Y-axis. The position of the holder, the dish and the bowl are shown, one inserted into the other, in Fig. 15, while different views are represented in Figs. 14, 16 and 17. For clarification, Figs. 19-24 show the situation where only the holder is secured in the dish for rotation about the Y-axis, and Figs. 25-30 show the situation where only the dish is secured in the bowl for rotation about the X-axis.

The spherical construction of the holder 1, the dish 3 and the bowl 2 is particularly suitable for fitting a drive system in the holder 1. In the above-mentioned practical application for a wing mirror, this means that in the holder, the drive system is mounted for rotating the mirror and hence the holder about the X-axis and the Y-axis relative to the bowl and hence relative to the mirror housing frame. Because the drive system mounted in the holder 1 must be capable of engaging the bowl 2, relatively large openings 20 are provided in the dish 3. As indicated in Figs. 31-33, the drive system is mounted in a spherical

support 21 that can be screwed down in the holder 1. For that purpose, the holder 1 has screw bushes 22, while the support is at corresponding positions provided with screw holes 23. The holder 1 and the support 21 may also be manufactured as one whole. For the rotation about each of the two axes (the X-axis and the Y-axis), the drive system comprises, in a manner conventional for mirror actuators, a motor in a housing 24 and a transmission mechanism 25. These components form in fact the actuator; in Fig. 39, this actuator, including the housing 24, is designated by 35. Although in the transmission mechanism, a rod-shaped transmission can be incorporated, the transmission in the present embodiment is completely designed as a gear transmission mechanism. By means of this transmission mechanism 25, an adjusting element is displaced in a first direction, while this adjusting element is freely movable in a second direction perpendicular thereto. To enable, in this manner, a rotation of the holder 1 relative to the bowl 2, two slots 26 and 27 are provided in the holder 1, which slots, viewed in the X-Y plane, are perpendicular to each other, while in the bowl 2, two slots 28 and 29 are provided, which slots, viewed in the X-Y plane, are perpendicular to each other, the slot 26 intersecting the slot 28 centrally and perpendicularly, and the slot 27 intersecting the slot 29 centrally and perpendicularly. The slots 28 and 29 in the bowl 2 extend from the circumferential edge to the center of the bowl. To each pair of slots 26, 28 and 27, 29, it applies that an adjusting element 30 is freely movable in the slot 28 and 29 respectively, and motor-drivable in the slot 26 and 27 respectively. However, the reverse is of course also possible, i.e. an adjusting element may also be freely movable in the slot 26 and/or 27 and motor-drivable in the slot 28 and 29 respectively. Although the adjusting elements 30 are provided between the bowl 2 and the holder 3, at the location of the openings 20 in the dish 3, the

adjusting elements project through the holder 1 for motor engagement from the inner space of the holder 1. One of the two adjusting elements 30 is shown in more detail in Fig. 38. The free movability of the adjusting elements 30 is realized in that they have their bowl-facing sides provided with a projection 31 engaging the slots 28 and 29. On their side projecting through the holder, the adjusting elements 30 are provided with teeth 32. In the Figure, the adjusting elements are designed as ring segments having inside teeth; a construction as ring segment having, for instance, crown teeth or bevel gear teeth is of course also possible. These teeth then cooperate with a correspondingly formed gear of the gear transmission mechanism.

The direction in which the adjusting elements 30 are motor-drivable may correspond to the two axis directions. However, if stepping motors are used instead of standard dc-motors, it is preferred that the adjusting elements be displaced by motor at an angle of 45° relative the two axis directions; this situation is shown in the embodiment depicted here (see Figs. 1 and 10). Accordingly, upon rotation about one of the axes, both motors are actuated. Due to the motor displacement of one or both of the adjusting elements and the free movability in directions perpendicular hereto, a rotation of the holder 1 with support relative to the bowl 2 is effected and, accordingly, when used in a wing mirror of a vehicle, a rotation of the mirror-adjusting plate with mirror relative to the mirror housing in which the mirror housing frame with bowl are fixedly mounted.

During assembly, the bowl can already be fixedly secured on the mirror housing frame. The mirror actuator 35 with accessories can be assembled as a separate unit; this unit hence comprises the holder 1, the support 21 containing the motors and the transmission mechanism and the mirror-adjusting plate 33 with mirror 34. Subsequently,

such unit can as a whole be snapped in the bowl in a simple manner, with the interposition of the dish.

The movement mechanism according to the invention enables a mirror actuator housing construction wherein the mirror rotation point S (see Fig. 39) is a virtual rotation point, formed by the intersection of the X-axis and the Y-axis, relative to which the actuator housing, i.e. the holder 1 with the support 21 and accessories, is movably connected to the mirror housing frame, including bowl 2, while the mirror-adjusting plate 33 with mirror 34 is fixedly mounted on the actuator housing. Further, in accordance with the invention, a mirror actuator housing construction is enabled wherein the drive means, i.e. the actuator 35, in the actuator housing on the one hand and the mirror-adjusting plate 33 with mirror 34 on the other, are located on either side of the rotation point S of the mirror-adjusting plate 33.

The electrically adjustable mirror construction hitherto described is further particularly suitable for fitting an electric wiring for realizing, apart from the electric mirror adjustment, other functions for the use of the mirror in the mirror housing. Such functions may for instance relate to a mirror heating, electrically dimming of incident light, keeping the mirror water-free through vibrations, and the like. To that end, the housing of the actuator 35 (Fig. 39) comprises an electric plug terminal 36 for a cable 37 realizing the connection to the electric board network of the vehicle. Further, on the mirror-adjusting plate 33, a separate electric terminal 38 is present for an electric connection 39 to the plug terminal 36 on the actuator housing 35, the line 39 forming a fixed looped through-connection of a number of cores of the line 37. Since the actuator housing 35 moves along with the mirror-adjusting plate 33, a vulnerable, flexible construction of the line 39 is no longer necessary.

The invention is not limited to the embodiments described hereinabove with reference to the Figures, but comprises all kinds of modifications hereof, of course in so far as these fall within the protective scope of the following claims. In particular, reference be made to a construction as shown in Figs. 34-37, where the dish 3 is on either side provided with outwardly bent lips or resilient elements 40, i.e. lips or resilient elements directed both to the bowl 2 and to the holder 1. In this manner, a defined friction between the bowl and the dish and between the dish and the holder can be realized.

CLAIMS

1. A mirror actuator housing construction, comprising a mirror housing frame having an actuator housing and a mirror-adjusting plate with mirror mounted therein, in which actuator housing drive means are present for rotating the mirror-adjusting plate with mirror relative to the mirror housing frame about a mirror rotation point located adjacent the mirror-adjusting plate, **characterized in that** the mirror rotation point is a virtual rotation point relative to which the actuator housing is movably connected to the mirror housing frame, and that the mirror plate with mirror is fixedly mounted on the actuator housing.

2. A mirror actuator housing construction according to claim 1, characterized in that in the actuator housing, the drive means are mounted for a rotation of the actuator housing with mirror-adjusting plate and mirror about two mutually perpendicular axes through the rotation point relative to the mirror housing frame.

3. A mirror actuator housing construction according to claim 1 or 2, characterized in that the actuator housing with the components fitted therein and secured thereon can be snap-fitted on the mirror housing frame as a unit.

4. A mirror actuator housing construction according to any one of the preceding claims, characterized in that drive means in the actuator housing on the one hand and the mirror-adjusting plate with mirror on the other are located on either side of the rotation point of the mirror-adjusting plate.

5. A mirror actuator housing construction according to any one of the preceding claims, characterized in that the actuator housing is formed by a substantially spherical holder, while, further, a substantially spherical bowl is present, forming part of the mirror housing frame, said holder and bowl, one inserted into the other, being

rotatable relative to each other about a first axis, the X-axis, and a second axis, the Y-axis, said axes lying in a plane which substantially coincides with the plane of the outer edge of the holder or extends parallel thereto and contains said rotation point.

6. A mirror actuator housing construction according to claim 5, characterized in that a dish located between the holder and the bowl is present, said dish being connected to the bowl for rotation about the X-axis only and being connected to the holder for rotation about the Y-axis only.

7. A mirror actuator housing construction according to claim 5 or 6, characterized in that the holder, viewed in the X-Y plane, comprises two mutually perpendicular slots provided through the holder, each of said slots having an adjusting element provided therein for displacement by motor, said adjusting element further being freely movable in the bowl in a direction, viewed in the X-Y plane, perpendicular to the direction of the relevant slot in the holder, wherein, further, the adjusting element engages, through the relevant slot in the holder, a drive mechanism placed in the holder, said drive mechanism being connected to a motor that is likewise placed in the holder.

8. A mirror actuator housing construction according to any one of the preceding claims, characterized in that the actuator housing is provided with an electric plug terminal, while on the mirror-adjusting plate, a separate electric terminal is present for an electric connection to the plug terminal on the actuator housing.

9. A wing mirror for a vehicle, comprising a mirror actuator housing construction according to any one of the preceding claims.

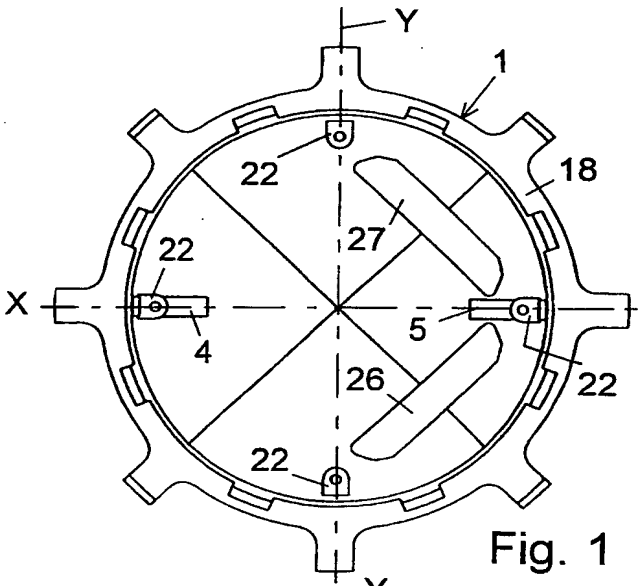



Fig. 1

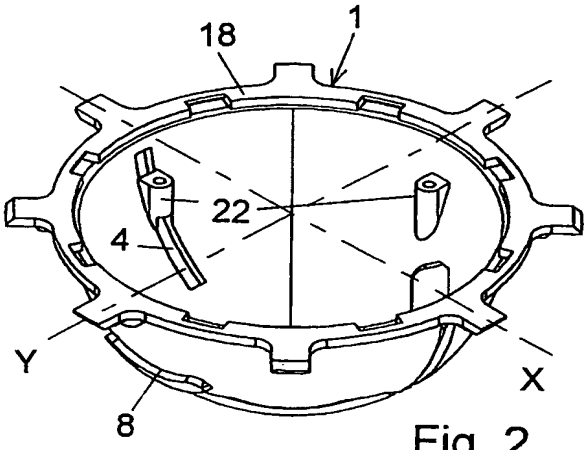



Fig. 2

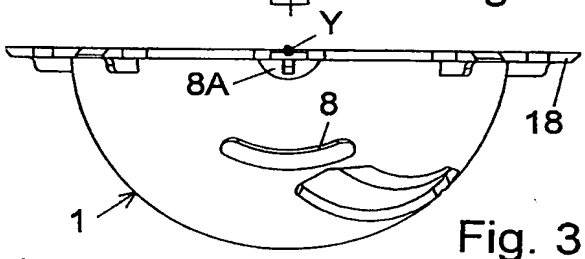



Fig. 3

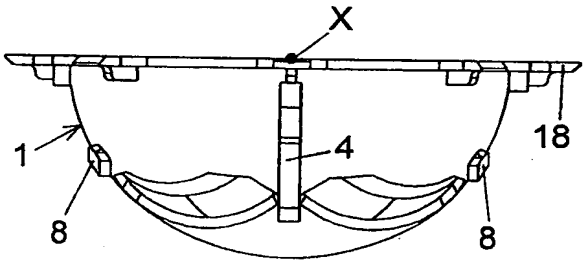



Fig. 4

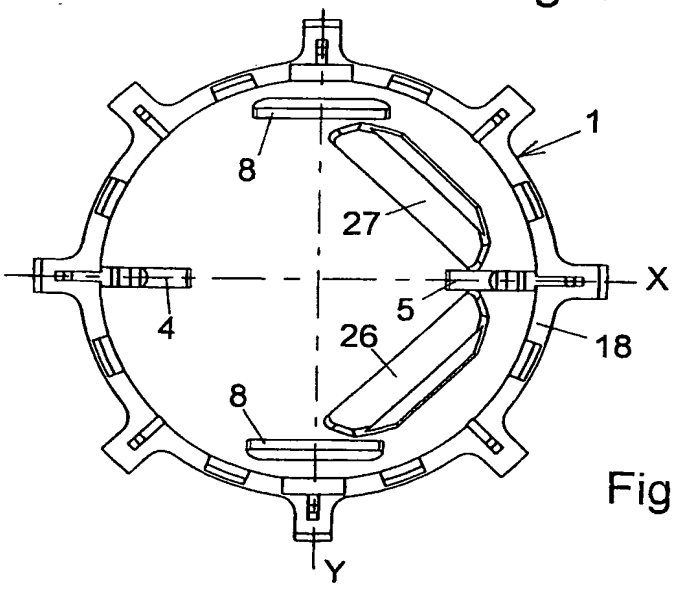



Fig. 5

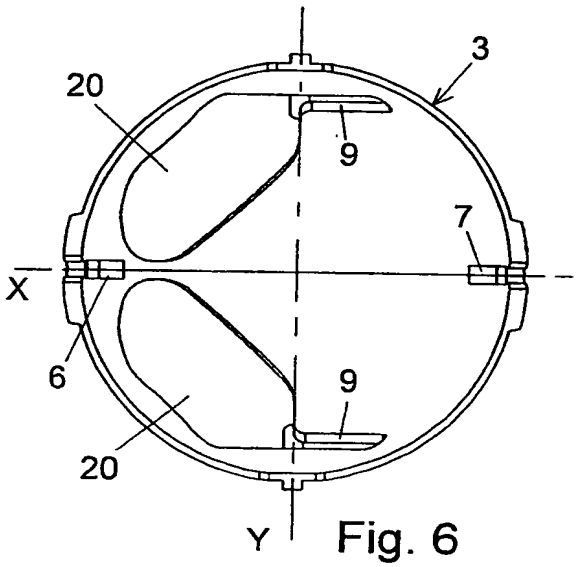



Fig. 6

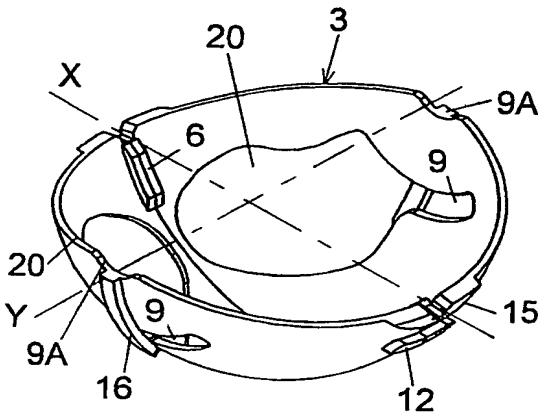



Fig. 7

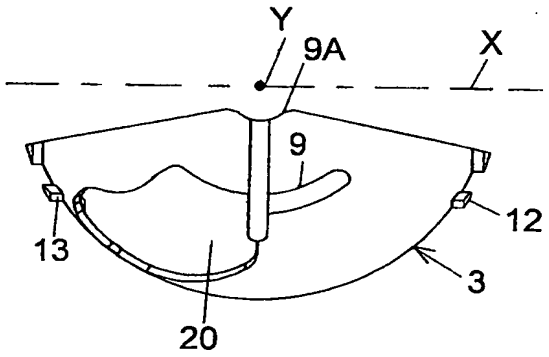



Fig. 8

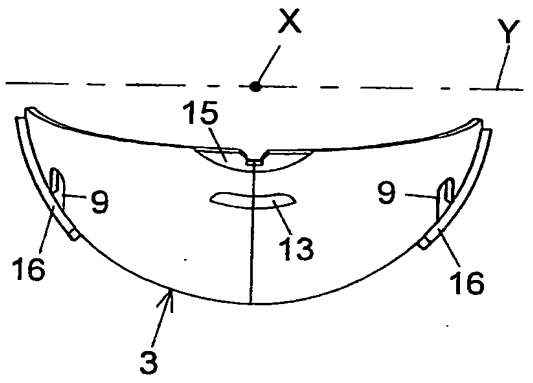



Fig. 9

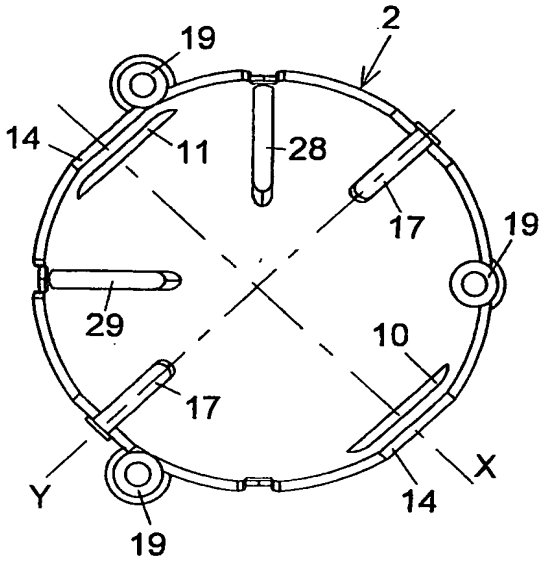



Fig. 10

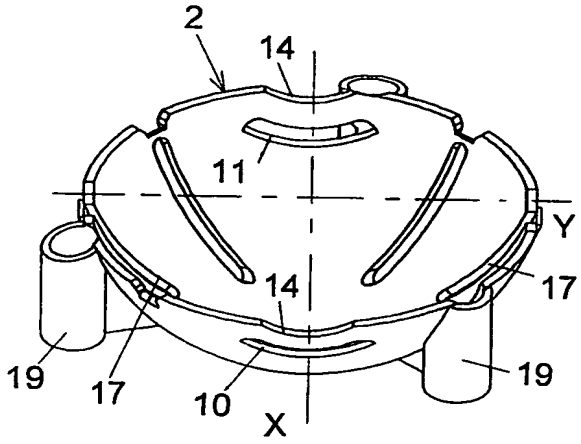



Fig. 11

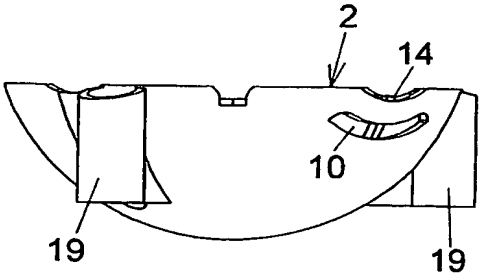



Fig. 12

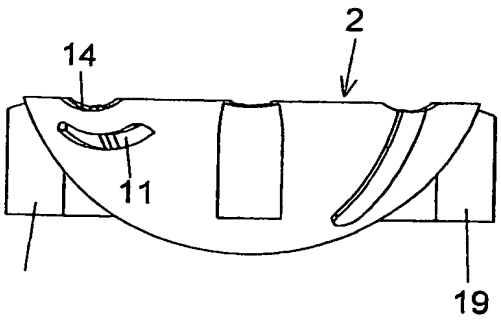



Fig. 13

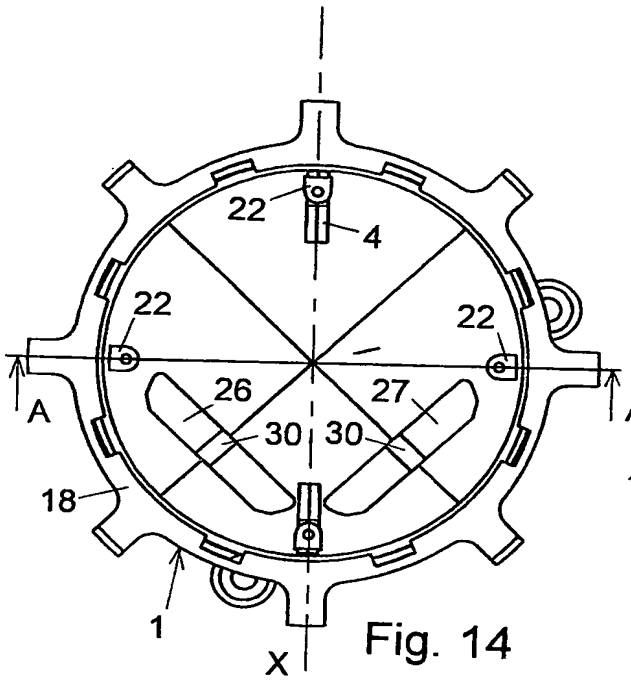



Fig. 14

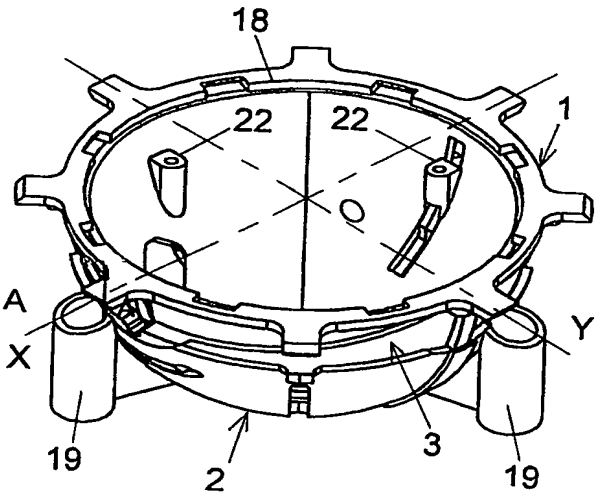



Fig. 15

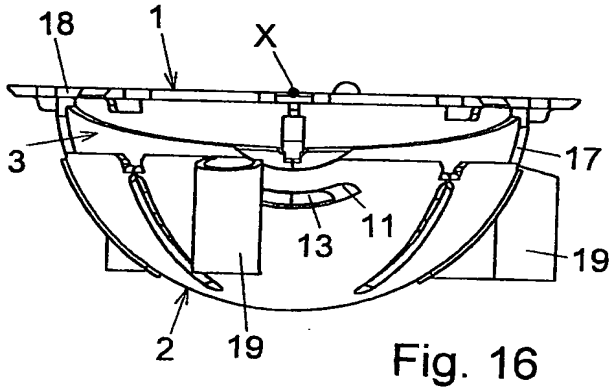



Fig. 16

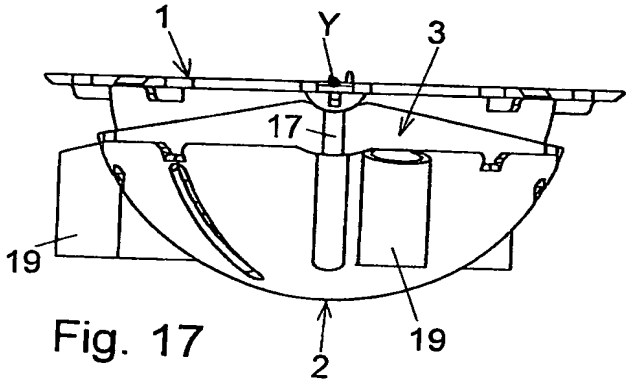



Fig. 17

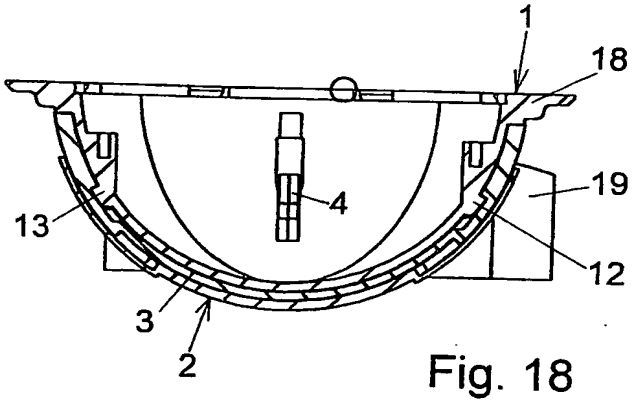



Fig. 18

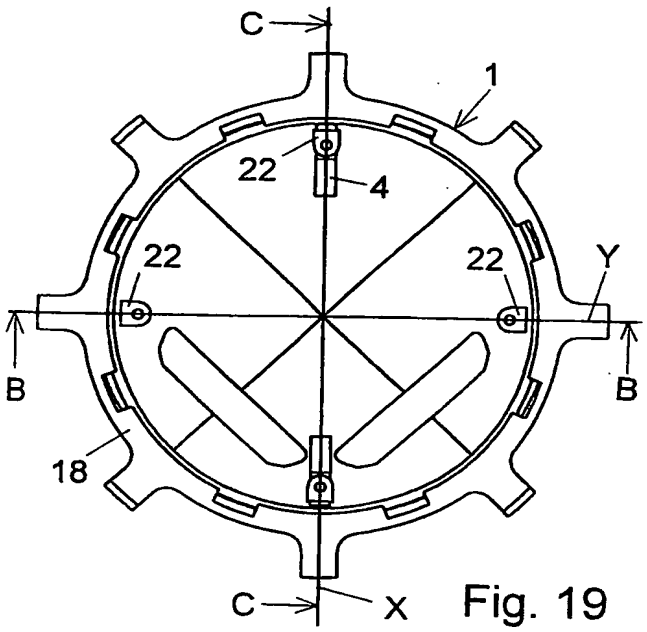
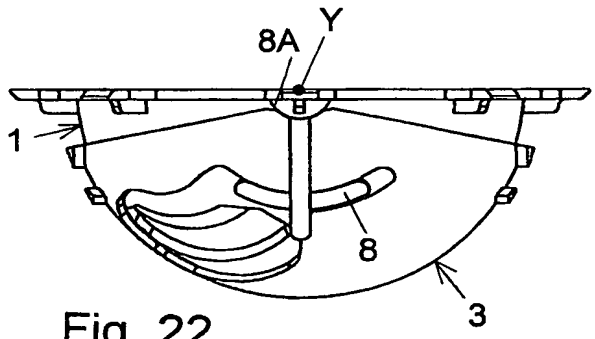



Fig. 19

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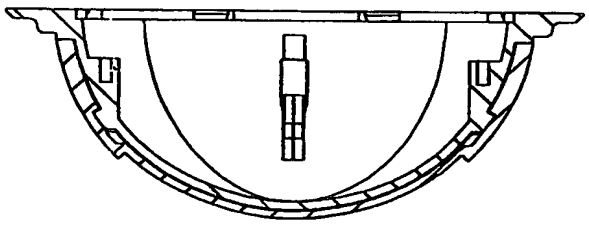

Fig. 23

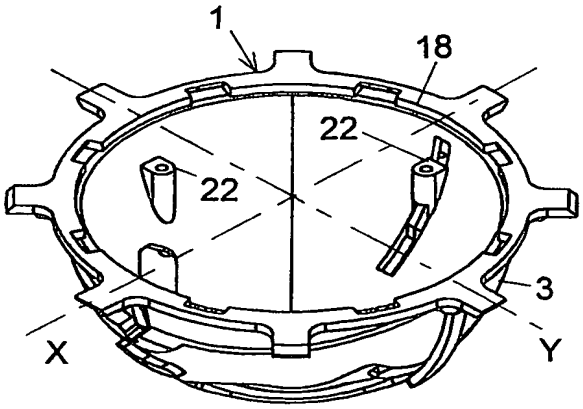


Fig. 20

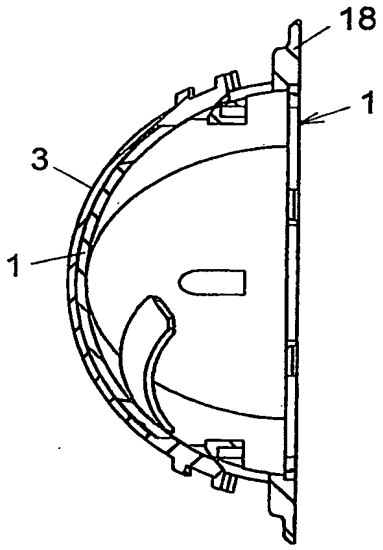


Fig. 24

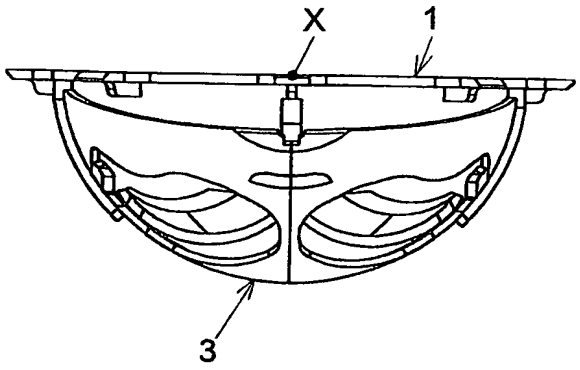


Fig. 21

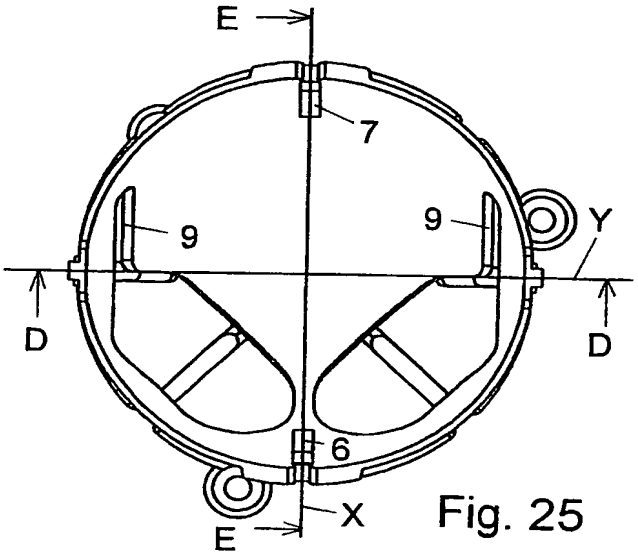


Fig. 25

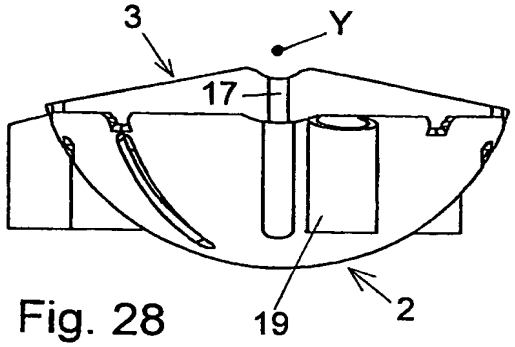


Fig. 28

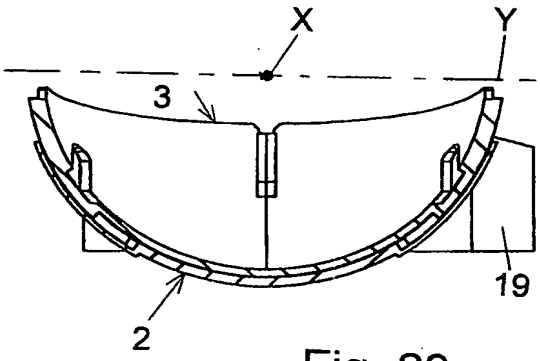


Fig. 29

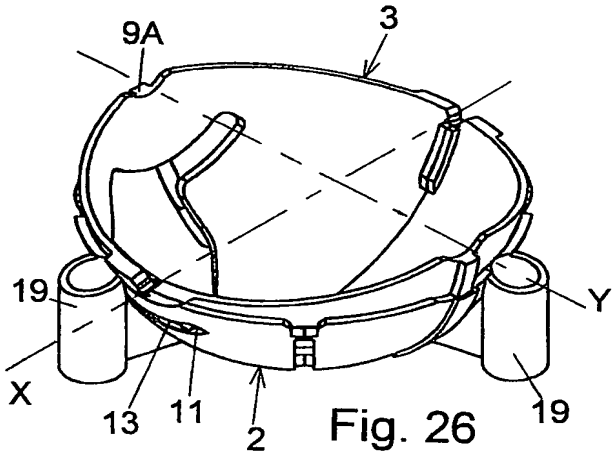


Fig. 26

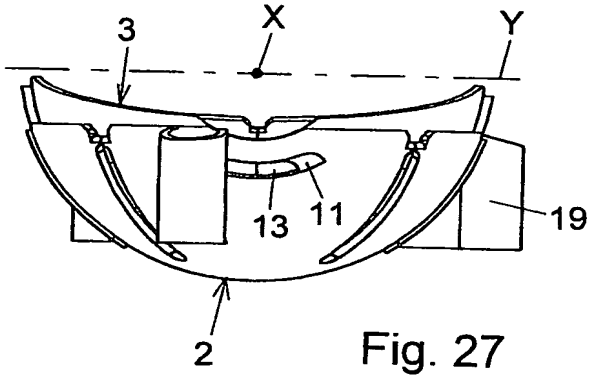


Fig. 27

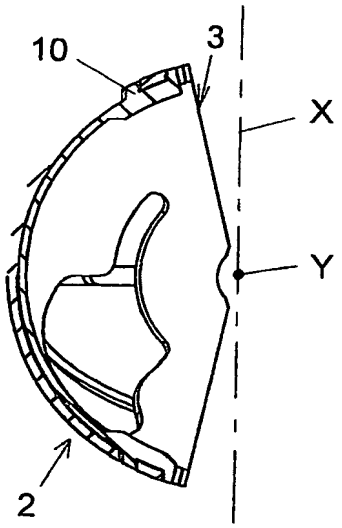


Fig. 30

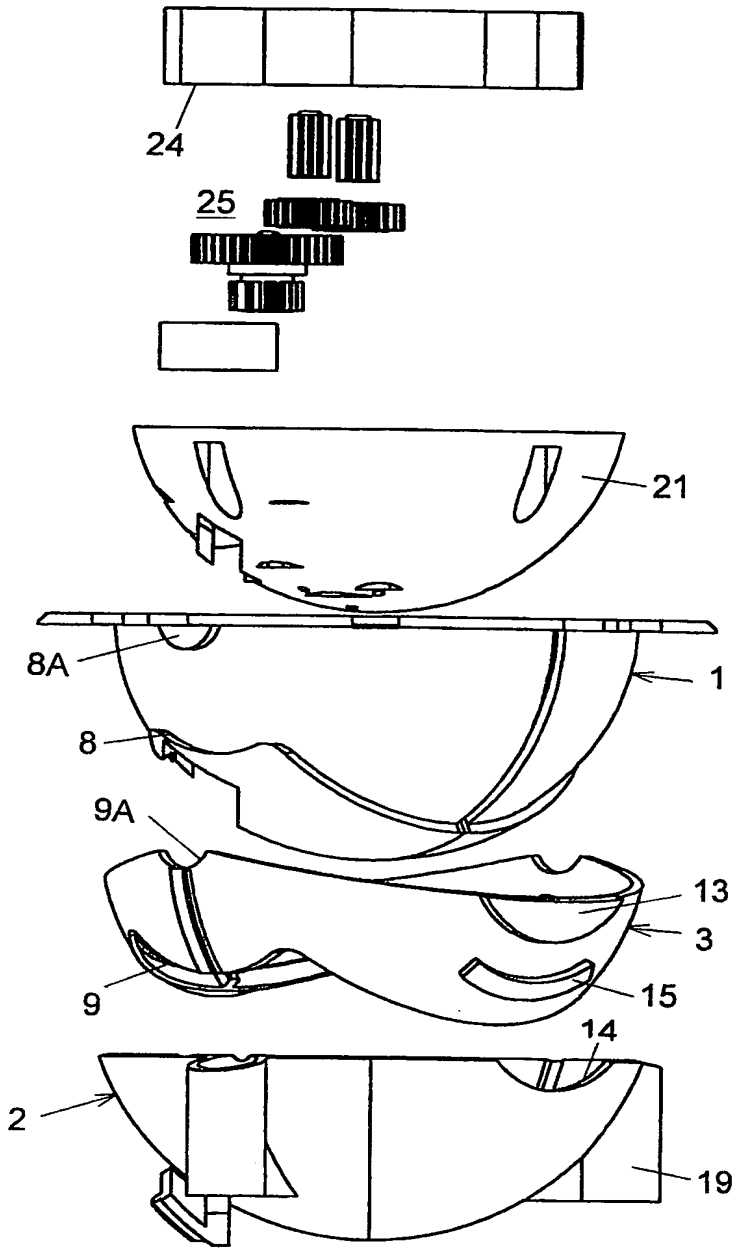


Fig. 31

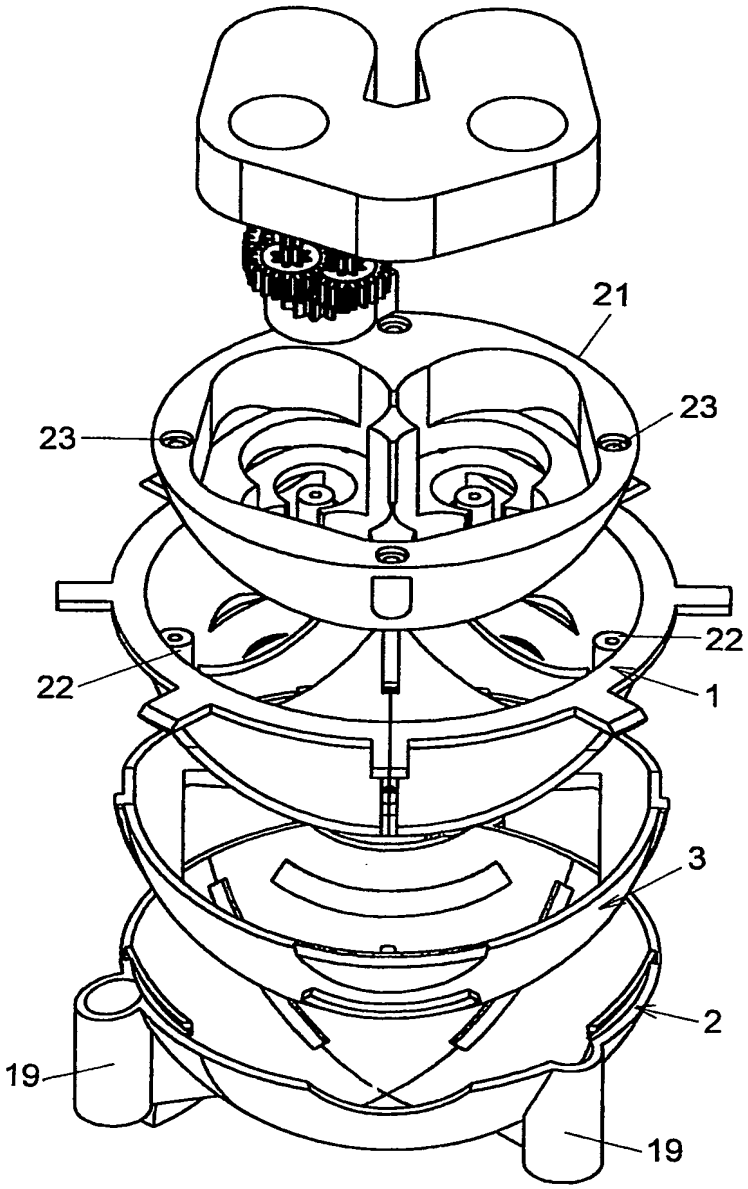


Fig. 32

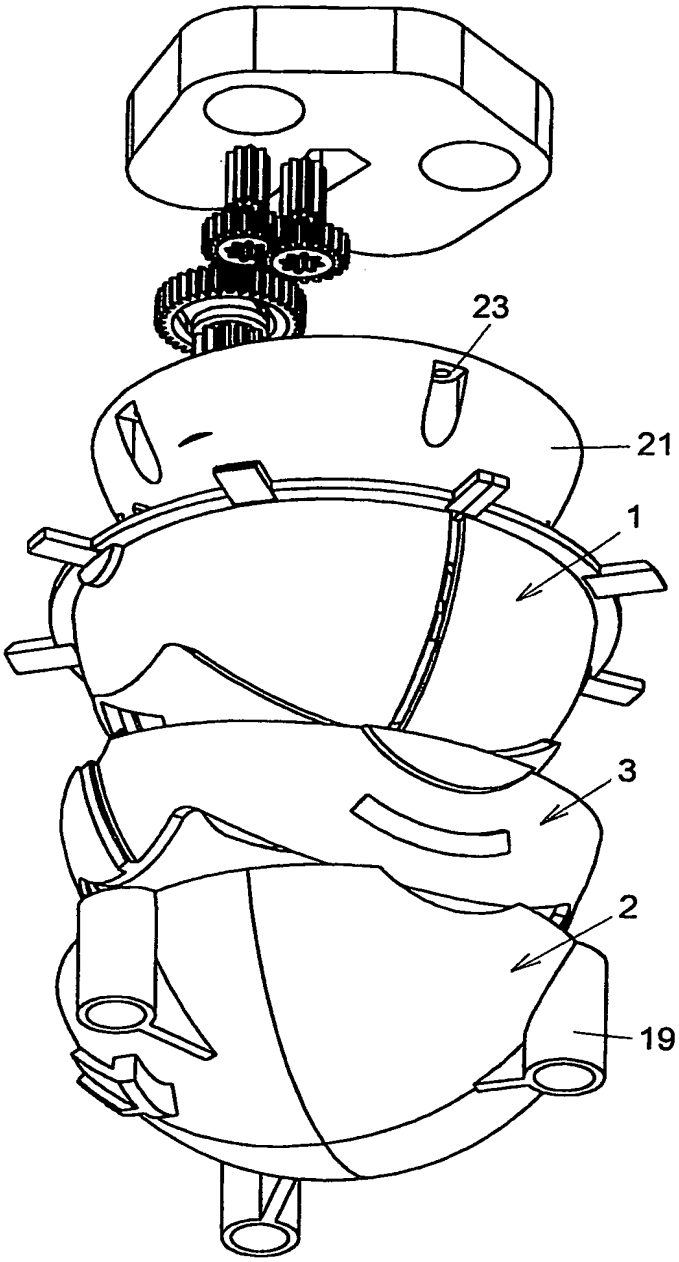


Fig. 33

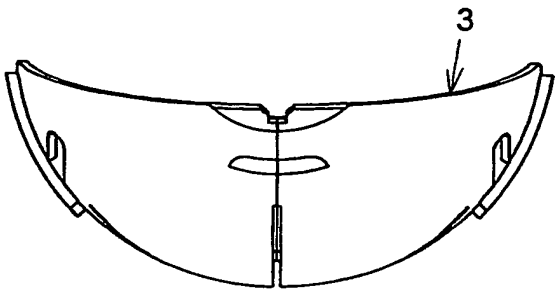


Fig. 34

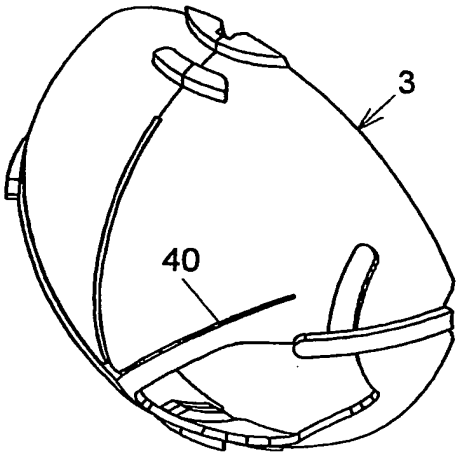


Fig. 35

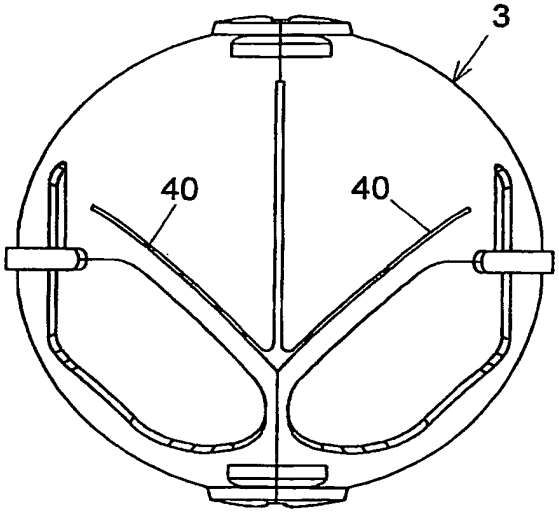


Fig. 36

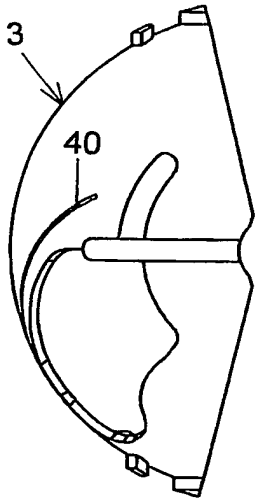


Fig. 37

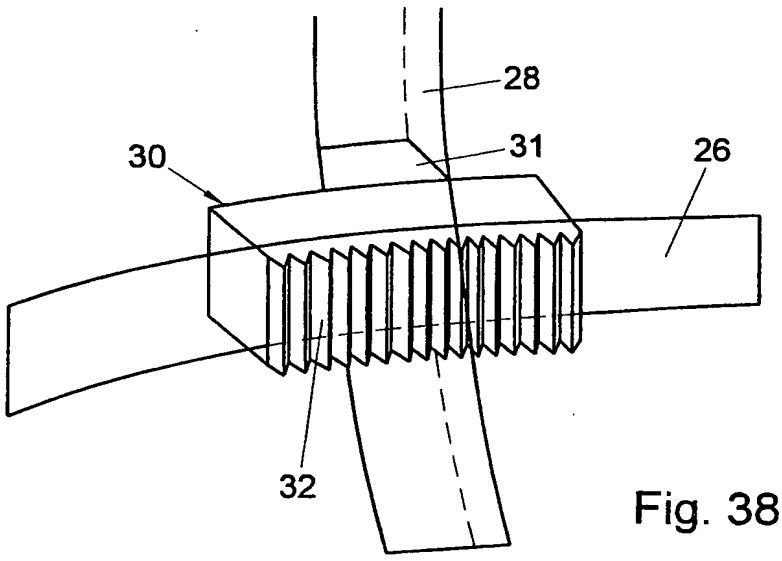


Fig. 38

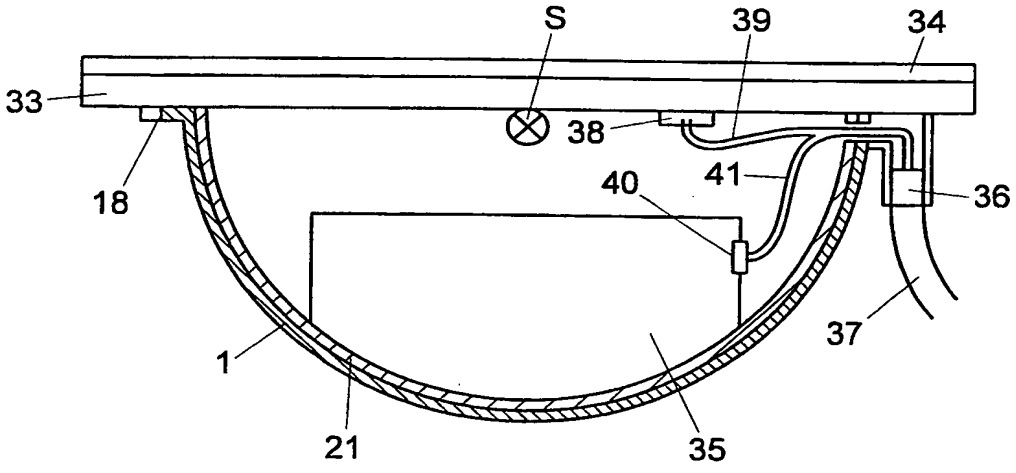


Fig. 39

# INTERNATIONAL SEARCH REPORT

International Application No
PCT/NL 00/00330

**A. CLASSIFICATION OF SUBJECT MATTER**
IPC 7 B60R1/06

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B60R

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category ° | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| A | FR 2 416 134 A (PAUL)<br>31 August 1979 (1979-08-31)<br>the whole document | 1,2,9 |
| A | FR 2 340 840 A (GILARDINI)<br>9 September 1977 (1977-09-09)<br>page 1, line 16 -page 4, line 27 | 1,2,9 |
| A | WO 98 31565 A (MAGNA REFLEX)<br>23 July 1998 (1998-07-23)<br>abstract | 5 |
| A | EP 0 075 259 A (BOSCH)<br>30 March 1983 (1983-03-30)<br>abstract | 6 |

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| 11 August 2000 | 18/08/2000 |

| Name and mailing address of the ISA | Authorized officer |
|---|---|
| European Patent Office, P.B. 5818 Patentlaan 2<br>NL - 2280 HV Rijswijk<br>Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,<br>Fax: (+31-70) 340-3016 | Knops, J |



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# INTERNATIONAL SEARCH REPORT

International Application No
PCT/NL 00/00330

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category ° | Citation of document, with indication,where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| A | US 4 991 950 A (LANG)<br>12 February 1991 (1991-02-12)<br>column 4, line 32-38 | 8 |

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# INTERNATIONAL SEARCH REPORT

Inter. national Application No
PCT/NL 00/00330

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---|---|---|
| FR 2416134 A | 31-08-1979 | NONE | |
| FR 2340840 A | 09-09-1977 | IT 1057170 B | 10-03-1982 |
| | | DE 2704973 A | 18-08-1977 |
| WO 9831565 A | 23-07-1998 | AT 405501 B | 27-09-1999 |
| | | AT 6797 A | 15-01-1999 |
| | | BR 9805896 A | 25-01-2000 |
| | | EP 0895499 A | 10-02-1999 |
| | | JP 2000507187 T | 13-06-2000 |
| EP 75259 A | 30-03-1983 | DE 3137780 A | 07-07-1983 |
| | | DE 3265430 D | 19-09-1985 |
| | | JP 58063539 A | 15-04-1983 |
| US 4991950 A | 12-02-1991 | DE 3811448 A | 23-03-1989 |
| | | DE 3862452 D | 23-05-1991 |
| | | EP 0306728 A | 15-03-1989 |